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TITLE: Organic semiconductor recognition complex and system

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APPL-NO: 09/ 608706

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PARENT-CASE:

CROSS REFERENCE TO RELATED APPLICATIONS This application claims the benefit
under 35 U.S.C. .sctn.119(e) of provisional Patent Application Serial Nos. 60/142,301, filed Jul. 2, 1999, and 60/199,620, filed Apr. 25, 2000. The invention described herein was made with Government support under contracts F41622-96-D-008 and F41824-00-D-700 awarded by the Department of the Air Force and Department of Energy contract number DE-AC06-76RL01830. The Federal Government has a nonexclusive, nontransferable, irrevocable, paid-up license to practice or have practiced for or on behalf of the United States the subject invention.

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FIELD-OF-SEARCH: 435/6; 435/91.2 ; 435/7.1 ; 536/23.1 ; 436/94

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ART-UNIT: 166

PRIMARY-EXAMINER: Horlick; Kenneth R.

ABSTRACT:

In a recognition complex system, nucleic acid ligands comprising random DNA sequences are operatively coupled to an organic semiconductor and distributed so as to form an array of recognition complexes. When an unknown chemical or biological analyte is applied to the array, the electrical and/or photochemical properties of one or more of the recognition complexes are altered upon binding of the nucleic acid ligand to the analyte. The degree to which the electrical and/or photochemical properties change is a function of the affinity of the nucleic acid ligand sequence for the analyte. The electrical and photochemical changes associated with the array, as a whole, can be used as a unique signature to identify the analyte. In certain embodiments, an iterative process of selection and amplification of nucleic acid ligands that bind to the analyte can be used to generate a new array with greater affinity and specificity for a target analyte, or to produce one or more nucleic acid ligands with high binding affinity for an analyte. The present invention also provides methods for preparing nucleic acid ligands that bind with high affinity to an analyte and using such nucleic acid ligands to neutralize the analyte.

62 Claims, 31 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 15

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Detailed Description Text - DETX:

An example of a nucleic acid ligand comprising nucleoside or nucleotide derivatives and mimics is a "polyether nucleic acid", described in U.S. patent Ser. No. 5,908,845, incorporated herein by reference, wherein one or more nucleobases are linked to chiral carbon atoms in a polyether backbone. Another example of a nucleic acid ligand is a "peptide nucleic acid", also known as a "PNA", "peptide-based nucleic acid mimics" or "PENAMs", described in U.S. patent Ser. Nos. 5,786,461, 5,891,625, 5,773,571, 5,766,855, 5,736,336, 5,719,262, 5,714,331, 5,539,082, and WO 92/20702, each of which is incorporated

herein by reference. A peptide nucleic acid generally comprises at least one nucleobase and at least one nucleobase linker moiety that is not a 5-carbon sugar and/or at least one backbone moiety that is not a phosphate group. Examples of nucleobase linker moieties described for PNAs include aza nitrogen atoms, amido and/or ureido tethers (see for example, U.S. Pat. No. 5,539,082). Examples of backbone moieties described for PNAs include an aminoethylglycine, polyamide, polyethyl, polythioamide, polysulfinamide or polysulfonamide backbone moiety.

Detailed Description Text - DETX:

Peptide nucleic acids generally have enhanced sequence specificity, binding properties, and resistance to enzymatic degradation in comparison to molecules such as DNA and RNA (Egholm et al., Nature 1993, 365, 566; PCT/EP/01219). In addition, U.S. Pat. Nos. 5,766,855, 5,719,262, 5,714,331 and 5,736,336 describe PNAs comprising nucleobases and alkylamine side chains with further improvements in sequence specificity, solubility and binding affinity. These properties promote double or triple helix formation between a target and the PNA.

Claims Text - CLTX:

31. The recognition complex system of claim 28, further comprising a data processing unit, a magnetic electrode and a magnetic filter.